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A NUDIBRANCH, *MURPHYDORIS SINGAPORENSIS*, NEW GENUS AND SPECIES, FROM SINGAPORE MANGROVES (MOLLUSCA: OPISTHOBRANCHIA: GONIODORIDIDAE)

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ABSTRACT. - *Murphydoris*, new genus (family Goniodorididae), lacks peri-anal ctenidia . The type species is *M. singaporensis*, new species, found associated with ctenostome bryozoa under dead wood debris at mid-tide level at the edge of mangroves.

INTRODUCTION

A small nudibranch has repeatedly been found associated with the bryozoan *Sundanella sibogae* (Harmer, 1915) under pieces of dead wood in a mangrove area between Kranji Dam and Sungei (= River) Buloh on the northwest shore of Singapore. It has also been found on fouling test plates submerged from a raft near the type locality (Lee, 1988). The species clearly belongs in the family Goniodorididae, but does not fit into any of the known genera with the same radula formula presently assigned to that family, viz. *Goniodoris* Forbes & Goodsir, 1839; *Okenia* Menke, 1830 - including *Cargoa* Vogel & Shultz 1970, see ICZN Opinion 1014; *Hopkinsia* MacFarland, 1905; *Goniodoridella* Pruvot-Fol, 1928; and *Teshia* Edmunds, 1966 (see Pruvot-Fol, 1928, 1954; Baba, 1960; Edmunds,1966; Franc, 1968; Schmekel & Portmann, 1982; Thompson & Brown, 1984; Bouchet & Ortea, 1983). I therefore propose to place the new species in a new genus, *Murphydoris*, and propose the name *M. singaporensis* for it.

Specimens are deposited in the Zoological Reference Collection of the Department of Zoology, National University of Singapore.

TAXONOMY

FAMILY GONIODORIDIDAE

Murphydoris, new genus

Type species - *Murphydoris singaporensis*, new species

Diagnosis. - Nudibranchs of the family Goniodorididae without peri-anal ctenidia, rhinophores non-lamellate, radula formula 1.1.0.1.1.

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Material examined. - Holotype and 9 paratypes collected at the type locality in the mangroves between Kranji and Sungei (= River) Buloh, Singapore, leg. J. B. Sigurdsson, 15.iv.1987.

Etymology. - The new genus is named for Associate Professor D. H. Murphy of the Department of Zoology, National University of Singapore, in recognition of his work on the fauna and ecology of mangroves of Singapore.

Remarks. - *Murphydoris* shares non-lamellate rhinophores with *Goniodoridella*, but is unique among goniodorids in lacking peri-anal ctenidia. The type of the genus is *M. singaporensis*, new species by monotypy.

Murphydoris singaporensis, new species

Description. - (Fig. 1). Small; average length about 4 mm (5 mm max.), width up to 2 mm. Body high, somewhat angular, general body wall colourless, translucent with colour of internal organs, white, yellow and brown showing through. Surface has many dark reddish-brown blotches and spots of irregular size and shape. All specimens examined have a large shallowly horseshoe-shaped spot behind rhinophores, and most specimens also have a large median spot in front of the rhinophores and an elongate forwardly sloping spot on each side below the eyespots. Mantle edges form two low ridges starting slightly in front of and to the sides of the rhinophores; these extend backwards, each ending in three bifid to trifid papillae on each side of anus, behind which the ridges join to form a median metapodial ridge. There are no peri-anal ctenidia. Rhinophores smooth (non-lamellate), non-retractile. Dorsal surface and sides with numerous low tubercles. Body wall contains numerous spicules which disappear in preserved specimens. Body wall also contains numerous glands (presumably defensive in nature). In some specimens kept in preservative, the glands contain hard, white concretions, and drops of secretions on outside of body are also fixed to hard crystalline concretions. Greatest number of such glands found on mantle margin ridges. Foot broad, as wide as the body. In live animals foot corners are slightly widened anteriorly, with slight embayment into front of foot. Mouth not visible in cleft between rounded labial tentacles. Anatomy: Buccal mass with a large non-pedunculate buccal pump and labial armature. There is a muscular thickening of the oesophagus, sub-triangular in cross section and presumably dilatable, close behind the buccal mass (Fig. 1D). Radula formula - n x 1.1.0.1.1.; unicuspid laterals have about 12 tiny denticles, the much smaller marginals are bicuspid (Fig. 1F). Genital system typical of family, including a penis armed with numerous spines (Fig. 1E). Spawn is laid in loose white coils; egg diameter about 80 μm, yolk diameter about 55 μm.

Remarks. - Although *M. singaporensis* and its spawn is always found on colonies of the bryozoan *Sundanella sibogae*, it has not been observed feeding on this bryozoan species. Live animals were occasionally observed adopting an interesting posture; they flatten the body with the result that the spicules penetrate out through the body wall producing a "hedgehog-like" effect which is presumably of a defensive nature.

As mentioned in the introduction, five of the nine genera of nudibranchs at present assigned to the family Goniodorididae have a radula of the same formula as *Murphydoris*, i.e. 1.1.0.1.1. The other four genera are *Ancula* Lovén (radula formula 1.1.1.1.1); *Trapania* Pruvot-Fol (radula formula 1.0.1.); *Bermudella* Odhner (radula formula 3.1.0.1.3); and *Spahria* Risbec, (radula formula 2.1.0.1.2.). Table 1 shows a comparison of the useful external characteristics of the genera which have the same radula formula as *Murphydoris*. The table shows that *Murphydoris*

Table 1. Comparison of genera of Goniodorididae with radula formula 1.1.0.1.1.

	ctenidia	rhinophores	mantle margin	mantle papillae in front of rhinophores
Goniodoris	numerous bipinnate circumanal	lamellate	mantle ridge reduced no tentacles	absent
Okenia	numerous bipinnate circumanal	lamellate	mantle ridge reduce numerous tentacles	1-2 pairs
Hopkinsia	unipinnate peri-anal	lamellate	mantle ridge absent numerous dorsal tentacles	numerous
Teshia	3 tufts of peri-anal ctenidia	lamellate	mantle edge well developed numerous mobile tentacles	3 pairs + 1 median
Goniodoridella	3 bifid perianal gills	non-lamellate	mantle edge well developed many papillae	1 pair
Murphydoris	absent	non-lamellate	mantle ridge reduced 3 pairs of bifid tentacles mantle ridge either side of anus	absent

shares some characteristics with several other goniodorid genera. The mantle ridges are much reduced like in *Goniodoris*, and the rhinophores are smooth like in *Goniodoridella* (Pruvot-Fol, 1928; Baba, 1960). The mantle ridges carry tentaculiform papillae on either side of the anus as in some *Okenia*. The unique combination of features in *Murphydoris* among the Goniodoridi-dae are the lack of ctenidia, non-lamellate rhinophores and lack of mantle papillae except on either side of the anus. The broad sole of the foot, as wide as the body, as well as the absence of mantle edge papillae in front of rhinophores also distinguishes *Murphydoris* from most small-sized members of the genus *Okenia* and from *Goniodoridella*.

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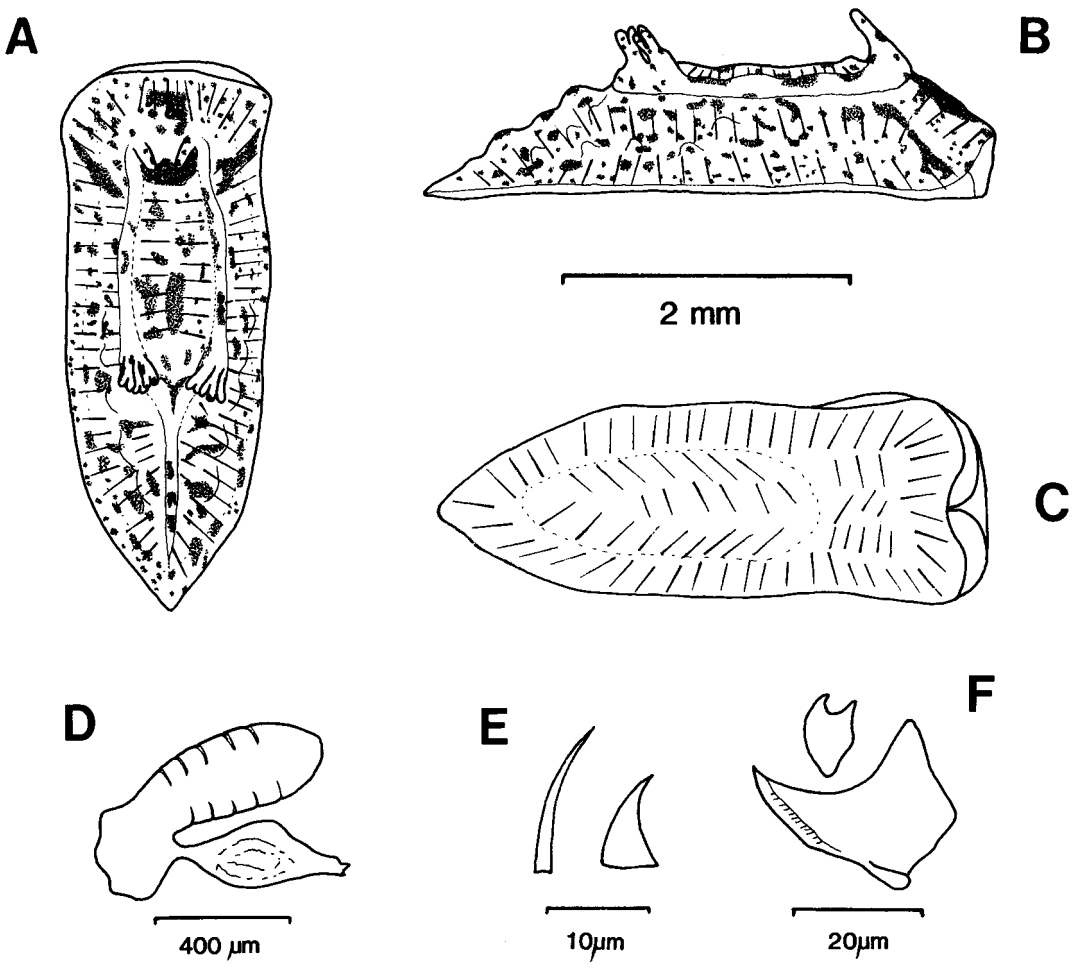

Fig 1. *Murphydoris singaporensis*, new genus, new species. A, Dorsal aspect of live animal (composite). B, Side view. C, Ventral view. D, Buccal mass with buccal pump and oesophagal pump. E, Penial spines. F, Radula teeth.

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